REMARKS

Reconsideration of the pending application is respectfully requested in view of the foregoing amendments and the following remarks.

Status of the Application

Claims 1-4, 6-9, and 25-42 are currently pending. Claim 5 is canceled, without prejudice, and claims 10-24 have been withdrawn, without prejudice. Claims 1 and 9 are amended in this response, while claims 25-42 are added.

The amendments to claims 1 and 9 are supported by, *inter alia*, the application and the claims as originally filed, *e.g.*, ¶ [0038] and originally-filed claim 1. No new matter has been introduced in the applicant by way of these amendments.

New claims 25-42 are supported by, *inter alia*, the application and claims as originally filed, *e.g.*, ¶ [0039] and originally-filed claims 1-8. No new matter has been introduced by way of any of these additional claims.

Summary of the Office Action

The non-final Office Action opens by noting that the Examiner has not considered the articles cited in conjunction with the Information Disclosure Statements submitted on September 11 and 29, 2003, because the titles of those articles were not included in the PTO-1449 forms submitted with those Information Disclosure Statements.

The Office Action next acknowledges Applicant's prior election with traverse of Group I, along with an election the species of claims 1-9. After considering Applicant's traversal, the restriction requirement is made final.

Claims 10-24 are withdrawn from further consideration as being drawn to a non-elected invention.

Claim 9 is objected to as being dependent on a rejected base claim. Applicant gratefully acknowledges the Examiner's statement that claim 9 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Turning to the substantive aspects of the Office Action, claims 1-8 are rejected under 35 U.S.C. § 102(b) as being anticipated by the Guglielmi et al. article ("Guglielmi et al.").

Next, claims 1-8 are rejected under 35 U.S.C. § 103(a) as being obvious over Guglielmi et al.

Claims 1-7 are also rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent 7,008,559 ("Chen").

Discussion

In response to the comments on the Information Disclosure Statements, Applicant submits with this response a substitute PTO-1449 form which corrects the inadvertent omission of the titles of the articles cited as a part of the previously-submitted Information Disclosure Statements and accompanying PTO-1449 forms. The Examiner's review of these articles, copies of which were previously submitted by Applicant, is respectfully requested. The Examiner is also respectfully requested to also place her initials on the PTO-1449 form next to each reference to indicate that each was considered on the merits.

In response to the objection to claim 9, Applicant has rewritten claim 9 in independent form and included all limitations of the claim upon which claim 9 was previously dependent (*i.e.*, those limitation included in the former claim 1). Accordingly, Applicant respectfully submits that the objection to claim 9 is overcome by the aforementioned amendment, and that claim 9 and those claims dependent thereon are in condition for allowance.

Turning to the substantive rejections, claims 1-8 are rejected under 35 U.S.C. § 102(b) as anticipated by Guglielmi et al.

Applicant respectfully submits that Guglielmi et al. fails to disclose, or motivate one skilled in the art to use, any metal capable of forming n-type semiconducting particles other than cadmium or mercury with a chalcogenide. Similarly, Guglielmi et al. fails to disclose, or motivate one skilled in the art to use, any metal capable of forming p-type semiconducting particles other than lead with a chalcogenide. Accordingly, Applicant respectfully argues that the currently-pending claims which require, *inter alia*, a metal capable of forming n-type semiconducting chalcogenide nano-particles is selected from the group consisting of zinc, bismuth, indium, tin, tantalum and titanium, are not anticipated by Guglielmi et al.

Claims 1-8 are also rejected under 35 U.S.C. § 103(a) as obvious over Guglielmi et al. However, metals other than cadmium, mercury, and lead are not disclosed or suggested by Guglielmi et al., and there is nothing set forth in this reference that would suggest or motivate a person of ordinary skill in the art to utilize metals other than cadmium or mercury, in the case of n-type semiconductors, or lead, in the case of p-type semiconductors. Absent such suggestion or teaching, the obviousness rejection should be withdrawn.

The Office Action further argues that the nanoparticles taught by Guglielmi et al. "have a particle size in the range of 3-8 nm, which is between the size of the taught PbS particles and the CdS particles, and are produced through coprecipitation. Page 232 teaches the particles comprise PbS and CdS phases. The taught nanoparticles exhibits [sic] luminescence different from that of CdS quantum dots and thus the lead also acts to spectrally sensitize the particles. The taught particles suggest those claimed."

In addition to the lack of disclosure or teaching concerning the use of metals other than cadmium, mercury, or lead, the unexpected properties of the presently-claimed compositions are not recognized by Guglielmi et al. For example, pages 229-230 of Guglielmi et al. indicates that the $Hg_xCd_{1-x}S$ and $Pb_xCd_{1-x}S$ nanoparticles provide non-linear optical effects in silica or silica/titania glass. These optical effects are fundamentally different from the photovoltaic effects exhibited by the presently-claimed compositions. Guglielmi et al. provides no recognition of such photovoltaic effects, especially for metals other than cadmium, mercury, and lead, and thus would not provide any motivation to alter the disclosure of Guglielmi et al. and provide the claimed invention. Accordingly, Applicant respectfully argues that the currently-pending claims are not obvious in light of Guglielmi et al.

Claims 1-7 are also rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 7,008,559 ("Chen"). The Office Action states that Chen "teaches manganese doped up-conversion luminescent chalcogenide nanoparticles, having a particle size of less than 100 nm, which overlaps the claimed range." Citing *In re Wertheim*, *In re Malagari*, *In re Fields*, and *In re Nehrenberg*, the Office Action argues that claims with numerical ranges overlapping those of prior art ranges have been held to be obvious. The Office Action further argues that the manganese acts to spectrally sensitize the metal chalcogenide, and that Chen

suggests $(Zn_{1-z}Pb_z)_{1-x}Mn_xS$ and $(Cd_{1-z}Pb_z)_{1-x}Mn_xS$. According to the Office Action, lead sulfide and either cadmium sulfide or zinc sulfide have low solubility in each other and therefore would form a two-phase particle in the overlapping range.

Applicant respectfully disagrees. Chen is directed to up-converting luminescent materials which may be a host (which may be a nanoparticle or a bulk material) having a dopant or dopants operably associated therewith. *See* Chen, col. 6, lines 35-47. Various nanoparticle hosts, including those cited in the Office Action, are described. Chen, col. 9, lines 8-31.

The UCL phenomenon described in Chen and relied on in the Office Action takes place within a single phase. In the Background of the Invention section of Chen, there is provided a series of examples where up-conversion occurs; in each example, the phenomenon occurs in a single host (*i.e.*, as single phase). *See* Chen, col. 1, line 60 to col. 2, line 5. In contrast, the present claims require, *inter alia*, two phases, and are thus not disclosed in or rendered obvious by Chen.

Chen further states that the "UCL material of the present invention can be described generically by the formula (X):(Y) wherein (X) is a host and (Y) is a dopant capable of increasing the luminescence intensity or quantum efficiency of the host." Chen, col. 8, lines 32-37. Chen describes that dopant at col. 8, line 45 to col. 9, line 7. As is clear from that passage, the dopants disclosed by Chen for use with a metal chalcogenide nanoparticle, such as ZnS, are all ions, and thus do not constitute a second phase.

Accordingly, Applicant respectfully submits that the presently-pending claims are not obvious in light of Chen.

Conclusion

As Applicant believes the application is in proper condition for allowance, the examiner is respectfully requested to rejoin the claims that were subject to the restriction requirement, and then pass the application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

/Christopher T. Griffith/

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